

EP1668883A2

Publication Title:

PORTABLE VIDEO STORAGE AND PLAYBACK DEVICE

Abstract:

Abstract not available for EP 1668883

(A2) Abstract of corresponding document: WO 2005032115

(A2) A portable video storage and playback device can download, store, and playback video files. In an exemplary embodiment, the files can be played-back in a number of different formats. In one embodiment, the invention includes a disk drive for storing a plurality of video files. A processor is coupled to the disk drive and configured to manage the files stored on the disk, which includes the ability to store, display and retrieve the video files. The invention includes a number of interfaces, for example, PAL/NTSC, S-Video and USB, which allows the video to be downloaded and played-back in any of these formats or protocols. The invention and includes a video encoder/decoder, which in one aspect is for MPEG. Advantages of the invention include the ability to store a number of video files in a compact portable device that can be transported and viewed at convenient locations.

Courtesy of <http://v3.espacenet.com>

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
7 April 2005 (07.04.2005)

PCT

(10) International Publication Number
WO 2005/032115 A2

(51) International Patent Classification⁷: **H04N**

(21) International Application Number:
PCT/US2004/031302

(22) International Filing Date:
24 September 2004 (24.09.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/506,088 24 September 2003 (24.09.2003) US
60/586,827 9 July 2004 (09.07.2004) US

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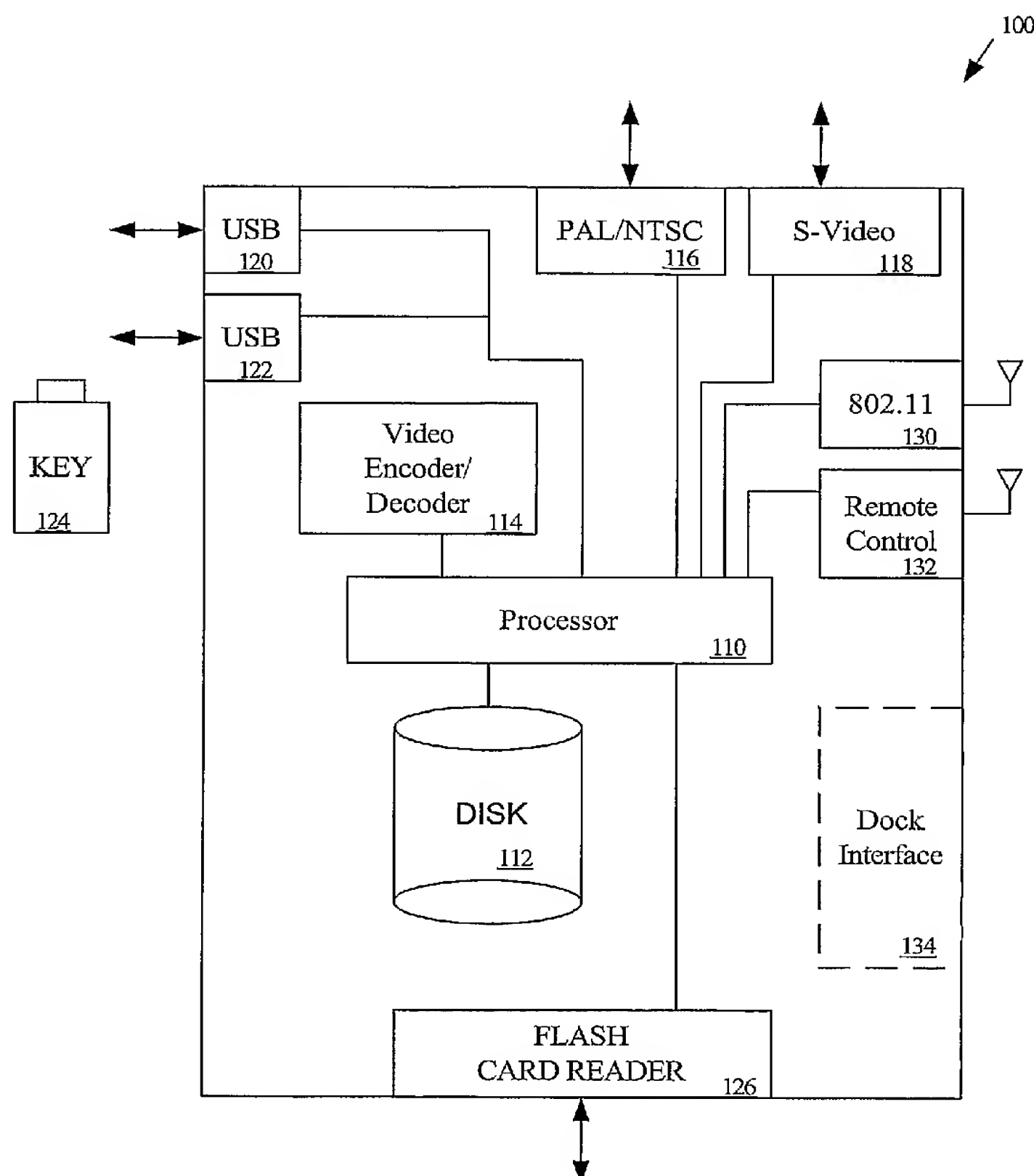
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(81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,
AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN,
CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI,
GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE,
KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD,
MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG,
PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM,
TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM,
ZW.

(84) Designated States (unless otherwise indicated, for every
kind of regional protection available): ARIPO (BW, GH,
GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM,

[Continued on next page]

(54) Title: PORTABLE VIDEO STORAGE AND PLAYBACK DEVICE



(57) Abstract: A portable video storage and playback device can download, store, and playback video files. In an exemplary embodiment, the files can be played-back in a number of different formats. In one embodiment, the invention includes a disk drive for storing a plurality of video files. A processor is coupled to the disk drive and configured to manage the files stored on the disk, which includes the ability to store, display and retrieve the video files. The invention includes a number of interfaces, for example, PAL/NTSC, S-Video and USB, which allows the video to be downloaded and played-back in any of these formats or protocols. The invention and includes a video encoder/decoder, which in one aspect is for MPEG. Advantages of the invention include the ability to store a number of video files in a compact portable device that can be transported and viewed at convenient locations.



ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

Published:

- *without international search report and to be republished upon receipt of that report*

PORTABLE VIDEO STORAGE AND PLAYBACK DEVICE

RELATED APPLICATIONS

[0001] This application claims priority to U.S. Prov. No. 60/586,827 filed July 9, 2004 and U.S. Prov. No. 60/506,088 filed September 24, 2003, incorporated herein by reference.

FIELD

[0002] The invention relates to the general field of a portable video storage and playback device.

BACKGROUND

[0003] Conventional video storage devices include video tape and digital video disks. These mediums are relatively bulky, which is satisfactory for stationary use, such as at home. However, with an increasing desire for mobility and use in different locations, user's options are limited to carrying around multiple video tapes or DVDs, but these mediums are inconvenient since they must be purchased from a store or by mail order.

[0004] What is needed is a compact portable video storage and playback device that can support the downloading, storage and playback of a number of video files.

SUMMARY

[0005] The invention relates to the general field of a portable video storage and playback device. The invention can download, store, and playback video files. In one embodiment, the files can be played-back in a number of different formats.

[0006] In one embodiment, the invention includes a disk drive for storing a plurality of video files. A processor is coupled to the disk drive and configured to manage the files stored on the disk, which includes the ability to store, display and retrieve the video files. The invention includes a number of interfaces thereon, for example, PAL/NTSC, S-Video and USB, which allows the video to be downloaded and played-back in any of these formats or protocols. The invention also includes a video encoder/decoder, which in one aspect is for MPEG.

[0007] The invention has the capability to store a number of video files, where files can be associated with permission attributes. In an optional embodiment, the invention has a security authentication key that serves to protect copyrighted works and prevent unauthorized dissemination of copyrighted works. This security mechanism can also protect user privacy since video file attributes can be set to playback videos only when the key is coupled to the device.

[0008] Advantages of the invention include the ability to store a number of video files in a compact portable device that can be transported and viewed at convenient locations.

DRAWINGS

[0009] The invention is described with reference to the following figures.

[0010] Figure 1 is an architectural view of a video storage and playback device according to an embodiment of the invention;

[0011] Figures 2A-B are exemplary embodiments of the invention;

[0012] Figures 3A-C depict an online video server and a user computer according to an embodiment of the invention;

[0013] Figure 4 depicts a kiosk according to an embodiment of the invention;

[0014] Figures 5A-B are flowcharts according to an embodiment of the invention; and

[0015] Figures 6A-C depict docking stations according to embodiments of the invention.

DETAILED DESCRIPTION

[0016] The invention is described with reference to specific apparatus and embodiments. Those skilled in the art will recognize that the description is for illustration and to provide the best mode of practicing the invention.

[0017] The invention relates to the general field of a portable video storage and playback device. The invention can download, store, and playback video files. In one embodiment, the files can be played-back in a number of different formats.

[0018] A. Device Architecture

[0019] In one embodiment, the invention includes a disk drive 112 for storing a plurality of video files. A processor 110 is coupled to the disk drive 112 and configured to manage the files stored on the disk, which includes the ability to store, display and retrieve the video files. The invention includes a number of interfaces thereon, for example, PAL/NTSC 116, S-Video 118 (e.g. digital video) and USB 120-122 (preferably 2.0), which allows the video to be downloaded and played-back in any of these formats or protocols. The invention and includes a video encoder/decoder 114, which in one preferable aspect is an MPEG encoder/decoder. A wireless interface 130, for example using an IEEE 802.11 protocol, is used to interface with other wireless local area network components and can be used to interface with a kiosk as described below. A remote control interface 132 is provided to remote control functionality. In addition, an optional dock interface 134 is used to couple to a docking station as described below.

[0020] Since the invention includes standard video outputs like PAL/NTSC and S-Video, the invention can be plugged directly into a television or monitor. The invention also includes

USB ports that can communicate with a computer for display on the computer monitor. The USB port is preferably USB 2.0, which is sufficiently fast to support video. Other interfaces are anticipated that can plug into legacy, existing and other future interfaces. One example is Fire-Wire, which can also be included in the invention.

[0021] The invention has the capability to store a number of video files, where files can be associated with permission attributes. In one embodiment, the invention has a security authentication key that serves to protect copyrighted works and prevent unauthorized dissemination of copyrighted works. This security mechanism can also protect user privacy since video file attributes can be set to playback videos only when the key is coupled to the device.

[0022] In one aspect of the invention, the security authentication is a hardware key that is coupled to the device to allow the playback of video files, which performs a function of digital rights management (DRM). This can be, for example, a USB key device 124 with a particular key (e.g. a MAC address), or a SIM card with an encryption key, as described below. The video player will only play the video back when the key is coupled to and recognized by the device. While a USB key is shown, any key can be used with the invention, including one that is embedded inside the device. In one aspect of the invention, the video is encoded with the key information so that only a device with the key can decode the video information. One interesting aspect of using a USB memory device as the key is that the USB memory device can contain defects that would ordinarily make it of little value for storing data, and the USB key can be used to store video files. Since a video file does not require perfection, an imperfect USB device makes a satisfactory video data storage device.

[0023] The encryption device is useful because the video header can be generated at download time based at least in part of the key 124. Then the video data can only be decoded and viewed with the key. This provides digital rights management features that are hardware specific, which prevents unauthorized copying and playback of that content. In one aspect of the invention, the header also includes a device identifier that is associated with the particular device 100. In the case of the device 100 including a particular identifying attribute, it qualifies as an authorized device for use on the network to communicate with the video server and download video content.

[0024] Since there are a number of possible subscription types, the device 100 can modify the video header to satisfy any restrictions placed on the subscription. For example, if the user is entitled to view a particular video file three times, the header can be modified each time the video is viewed. Once the video is viewed the maximum number of time, then the video would not be permitted to be viewed any longer without a modification to the subscription attributes.

[0025] In addition to the interfaces described above, the invention includes a flash memory interface that can be used to upload digital photographs, video clips or other files stored on the flash memory. Likewise, the invention can also store information on the flash memory for use in other devices.

[0026] Figures 2A-B are exemplary embodiments of the invention that include an integrated video display. Figure 2A depicts a video display 220 built into the device and control buttons 230 disposed below the display. Figure 2B depicts a video display 270 built to swing upward and expose the control buttons 280.

[0027] Power can be supplied by an internal or external battery source, or from a standard electrical power outlet. As described above, the invention may be connected to a television, computer monitor or other display device. In one aspect of the invention, the device can be coupled to a video player or DVD player to record video onto the disk 112. In another aspect of the invention, video can be downloaded onto the disk 112 using a computer connected to the USB port.

[0028] B. Server and Kiosk Configurations

[0029] The device 100 can be used in conjunction with an internet server or kiosk. In the case of an internet server, the device communicates over the internet to communicate identification data and download content. The identification data includes, for example, subscriber identity, subscription type and other such information. Once the device has been authenticated and the user's credits have been authorized, the requested content is downloaded to the device. In the case on a kiosk, the device communication is similar, but the kiosk may have content stored on a local storage medium that can be quickly delivered to the device. For example, the device may be in close proximity to or even connected to the kiosk to enable high bandwidth communication between the kiosk and the device 100.

[0030] Figures 3A-C depict an online video server and user computer according to an embodiment of the invention. In this embodiment, a user opens a network browser (e.g. an Internet browser) and visits a web site that has video filed for download. Figure 3A depicts an exemplary screen 300 showing a technique for downloading video files. Figure 3B depicts an exemplary network server 350 that stores video files and makes them available for download over the network (e.g. the Internet).

[0031] Figure 3C depicts a user computer 350, which the device 100 could connect to in order to download the video files from the video server 330. In one such aspect, a key is coupled to the device while downloading to authenticate the user and create a code that will only allow playback when the key is coupled to the device. A user would either purchase each video separately, or may subscribe to license a specific number of videos at any one time. For

example, if the user subscribes to 5 videos, the server would store the key information related to the user and the software would ensure that the key associated with that user only had that limited number of videos associated with it and would not allow the download of additional videos until the device confirmed that videos were deleted from the device. In this manner, the user is limited to their subscription.

[0032] Figure 4 depicts a kiosk 410 according to an embodiment of the invention, which is connected to a video server 330 over the Internet. The kiosk stores and display locally stored video content on display 412 for selection by users and fast download to video devices. The kiosk 410 periodically downloads video content from the server over an Internet interface 414 to make content available to users via high-speed local interfaces 416 and 418, which may be a physical socket or an antenna for wireless LAN communication. Since a conventional Internet connection is typically less than 1Mbit/s, it may take a while for video to download. However, the local interface 416 can easily be in the range of 10-100Mbit/s, which enables much faster local downloads. The local interface 416 and socket 417 can be an Ethernet, USB, FireWire or other type of interface.

[0033] The kiosk is helpful for a number of reasons including that the users can interact with the kiosk to preview videos while the device is downloading and/or modify their subscription attributes. The user can decide on the subscription attributes in general, or can decide on subscription attributes for each particular video file. These attributes include: number of plays, rental time, rental quota limit, purchase, etc.

[0034] The kiosk stores the videos as headerless files. The video data is not playable without a valid header file so there is little chance that a person could break into a kiosk and distribute illegal copies of video content. In fact, the headers are generated at download time and based in part on the device identity and the user's security key, which is also referred to as a digital rights management (DRM) key.

[0035] The kiosk serves as a control layer, and not only as a distribution layer in the process. The kiosk includes administrative and billing center that communicates with the central server 330 to perform transactions including updating subscriptions and downloading video content.

[0036] C. Operation

[0037] Figures 5A-B are flowcharts according to an embodiment of the invention. Figure 5A depicts a technique for downloading video content and Figure 5B depicts a technique for playing video content.

[0038] In Figure 5A, step 510 begins the download process. Step 512 authenticates the user by way of password, identification key or other such technique. In step 514, the user

searches the available titles and identifies one for download. In step 516, the user requests the download. In step 518, the invention checks the download limit for the subscriber. If the subscriber is within the limit then the download is approved in step 520. In one aspect, shown in step 522, the video content is encoded with the subscriber key information prior to download. If the download is not approved in step 520, the subscriber has an option to pay for the new download in step 524. If the subscriber has a limited number of videos that he may check out, the subscriber may be able to delete a downloaded file and then be approved to download the new file. If the subscriber chooses not to pay or take other such action, the then process ends in step 526.

[0039] In Figure 5B, step 560 begins the play process. Step 562 checks the user's key to ensure that it authenticates the video. If the key is correct, the step 564 decodes and plays the video. If the key is not correct, then step 566 refuses to decode and play the video. In one aspect of the invention the video is encoded with information related to the key, and the key must be coupled to the device in order to enable playback.

[0040] D. Billing Management

[0041] The billing for the video downloads and/or subscription can be managed in a unified manner along with other services. For example, an Internet Service Provider (ISP) may want to offer a video service according the invention and bill the service along with the Internet access fee. The ISP employs the invention to track the subscribers and to monitor their downloads and subscriptions as appropriate.

[0042] E. Docking Station

[0043] Figure 6A depicts a docking station 520 according to an embodiment of the invention. The docking station includes a cradle 522, a device interface 524 and a video output 526. The docking station provides a cradle for the device 100 to couple with an external display such as a television or computer monitor, for example. The docking station cradle also provides power to the device 100 to either power the device or recharge batteries in the device. Figure 6B also shows an interface panel for the docking station including a power input 528.

[0044] In one embodiment, shown in Figure 6B, the docking station includes an internet interface 535. This additional interface permits the device 100 to connect with a video server and download video data to the device 100.

[0045] In another embodiment, shown in Figure 6C, the docking station includes a video input interface 547. This interface permits the device 100 to record video directly from a video input and to provide a record mode as described below.

[0046] The docking station can be configured to operation in three exemplary modes with additional modes anticipated.

[0047] 1. Standard Play Mode

[0048] Standard play mode involves playing back video data that is stored on the video storage and playback device 100. The controls for playing the content are on the device 100 or commanded by a remote control that communicates with the device 100 or docking station.

[0049] 2. Push Mode

[0050] By using an internet interface 522, the device can download video content during non-peak hours such as at night. The video content will be available for the user to remove the device from the docking station and either view the content on the device 100 or with the docking station.

[0051] 3. Record Mode

[0052] Another mode is a record mode that stores the video while a user is watching the program so that the user can take a break or review certain portions of the video while continuing to record the incoming video stream.

[0053] F. Additional DRM Features

[0054] 1. Definitions.

[0055] Digital Rights Management (DRM) is a system for protecting the copyrights of data circulated via the Internet or other digital media by enabling secure distribution and/or disabling illegal distribution of the data. Typically, a DRM system protects intellectual property by either encrypting the data so that it can only be accessed by authorized users or marking the content with a digital watermark or similar method so that the content can not be freely distributed.

[0056] A Subscriber Information Module (SIM) is, for example, a small, stamp-size "smart card" as used in a cellular GSM-type phone. The SIM card contains a microchip that stores data to identify the caller to the network service provider. In the present invention, the SIM is used to identify the network user to the inventive network and, optionally, to lock and encrypt content using DRM.

[0057] A SIM Stick is a SIM that is pluggable into a PC or other device through a standard interface such as USB, serial port, or other interface.

[0058] A Removable Memory Device (RMD), which is sometimes called a keychain drive or a USB drive, flash drive, or disk-on-key is a plug-and-play portable storage device that uses flash memory or miniature disk drive and is lightweight enough to attach to a key chain or carry in a pocket. An RMD can be used in place of a floppy disk, Zip drive disk, or CD. When the user plugs the RMD into a USB port on a computer, the operating system recognizes the device as a removable drive. Unlike most removable drives, a keychain drive does not require rebooting after it's attached, does not require batteries or an external power supply, and is

platform independent. Several keychain drive manufacturers offer additional features such as password protection, and downloadable drivers that allow the keychain drive to be compatible with older systems that do not have USB ports.

[0059] 2. How DRM Works

[0060] DRM protects content by encrypting it and including a header of the file that describes how the content is to be used. As an example, methods of use may include: (a) a restriction on the number of times the content can be viewed or played, (b) a restriction on the amount of time that the content is valid, for example, after a time the content is no longer viewable or playable, or (c) unrestricted play by the user, for example, a content purchase or perpetual license method.

[0061] DRM protected content is locked using a key. The key is often related to either a Username and Password or a Username and a Device ID. When locked by a Username and Password, the DRM usually requires a connection to the Internet so that the Username and password can be verified and the methods of use can be verified. This is considered an Online mode of DRM protection. The content viewer application needs to be aware of where to go on the Internet for verification.

[0062] Alternatively, DRM can be used in an Offline or Embedded Device mode. In this mode, the device provides its own method of verifying the user and opening the content, and does not need to be connected to the Internet. In this mode, the content is locked to the device and can only be used on the device.

[0063] In the Offline mode, information concerning the file, including information on when it was viewed, is stored in a protected area on the device. It is the responsibility of the device manufacturer to insure that the protected area is not accessible to the user of the device. This information is used by the viewer application to verify the DRM methods for the file prior to opening it.

[0064] 3. Identification through a SIM Stick

[0065] The SIM stick has two purposes in the inventive network. It can be used to identify the user of the network for billing purposes, and, optionally, it can be used to identify the device to which the DRM protected content is tied.

[0066] When used to identify the user, for example, standard GSM A3 authentication techniques are used to prevent fraud. The A3 algorithm is used by a GSM network to authenticate a GSM mobile phone. The GSM A3 algorithm is a one-way function implemented in the subscriber identity module (SIM). The inventive network contains an authentication center (AuC) for this purpose.

[0067] However, the SIM can also be used to provide the device ID for DRM protected content in the Offline mode. In this case, the SIM Device ID is used to lock the content and information about the DRM protected files is stored on the SIM. When used with a special viewing application that knows to use the SIM as the locking device and knows how to handle the DRM, the content can be moved between devices, even in the Offline mode. In this example, one requirement is that all devices use the special viewing application, which may be downloaded from the Internet

[0068] 4. Distribution through a Combined SIM and Removable Memory Device (Key)

[0069] When the SIM is combined with a removable Memory Device such as a USB Flash disk in a Key, then the user has the above capabilities of the SIM stick and also a removable device to which the DRM protected content can be downloaded.

[0070] Using the inventive kiosk network, the user inserts the combined SIM and removable memory device into, for example, a standard USB 2 port. The network verifies the user's identity using the SIM, locks the content to the SIM Device ID and downloads the locked content to the memory of the Key POD. The user now has a convenient way to transport DRM protected content and play it on multiple devices in the Offline mode.

[0071] 5. Distribution through a Removable Memory Device

[0072] Even without the SIM in the Removable Memory Device, the inventive network can download DRM protected content to the Memory device. In this case the DRM header information is missing from the content file.

[0073] When the inventive network user decides to play the content, he must connect to the Internet and contact the video server in order to obtain the header information. The user does not need to decide until this time how he wants to use the content. Based on how the user wants to use the content, the inventive network will properly bill the user and construct the DRM header. For example, the user may want to view the content 3 times, or may decide that the content is to be available for 5 days. Alternately, the user may choose another permissible DRM method. Once the header information is downloaded to the user the content can be viewed in the Offline mode. The ability to defer deciding how to purchase and/or use the content is unique in the Offline mode.

[0074] Additionally, the file can be copied and sent to others. However, the other users are not authorized to view the content until they contact the video server and pay for the right to view the content in an agreed upon manner.

[0075] G. Conclusion

[0076] Advantages of the invention include the ability to store a number of video files in a compact portable device that can be transported and viewed at convenient locations.

[0077] Having disclosed exemplary embodiments and the best mode, modifications and variations may be made to the disclosed embodiments while remaining within the subject and spirit of the invention as defined by the following claims.

CLAIMS

1. A video storage and playback device comprising:
 - a storage medium configured to store a plurality of video files;
 - a plurality of interface ports configured to communicate video data;
 - a video encoder/decoder configured to encode and decode video data; and
 - a processor coupled to the storage medium, the plurality of interface ports and the video encoder/decoder and configured to manage the video files.
2. The video storage and playback device of claim 1, wherein:
 - the processor is configured to manage the video files by storing, displaying and retrieving the video files.
3. The video storage and playback device of claim 2, further comprising:
 - a key configured to couple to one of the interface ports, wherein the key includes information for a server to encode video files and for the device to decode video files.
4. The video storage and playback device of claim 1, further comprising:
 - a kiosk configured to download video files from a server and to provide access to the video files to the device.
5. The video storage and playback device of claim 2, wherein:
 - the video server is configured to identify the subscriber using information associated with the key.
6. The video storage and playback device of claim 1, further comprising:
 - a billing server configured to account for video files downloaded by the device.
7. A video kiosk for use with a video storage and playback device, comprising:
 - a storage medium configured to store a plurality of video files;
 - an interface port configured to communicate with a central video server and to download video data from the central video server;
 - at least one interface ports configured to communicate video data with the video storage and playback device;

a processor coupled to the storage medium and the interface ports and configured to selectively control the storage medium and interface ports; and

a video encoder/decoder configured to encode video data based at least in part on an authorization code associated with the video storage and playback device..

8. The video kiosk of claim 7, wherein:

the processor is configured to manage the video files by storing, displaying and retrieving the video files; and

the processor is configured to authenticate a video storage and playback device by communicating data to the central server and selectively authorizing dispensation of video data to the video storage and playback device based at least in part on subscription data.

9. The kiosk of claim 8, wherein:

the video server is configured to identify the subscriber using information associated with the key.

10. The kiosk of claim 7, further comprising:

a billing server configured to account for video files downloaded by the device.

11. The kiosk of claim 8, further comprising:

a billing server configured to account for video files downloaded by the device.

12. A docking station for use with a video storage and playback device comprising:

a plurality of interface ports configured to communicate video data with the video storage and playback device and a display; and

an authentication device configured to permit decoding the video data.

13. The docking station of claim 12, wherein:

the processor is configured to manage the video files by storing, displaying and retrieving the video files.

14. The docking station of claim 12, further comprising:

a key configured to couple to one of the interface ports, wherein the key includes information for a server to encode video files and for the device to decode video files.

15. The docking station of claim 13, wherein:

the video server is configured to identify the subscriber using information associated with the key.

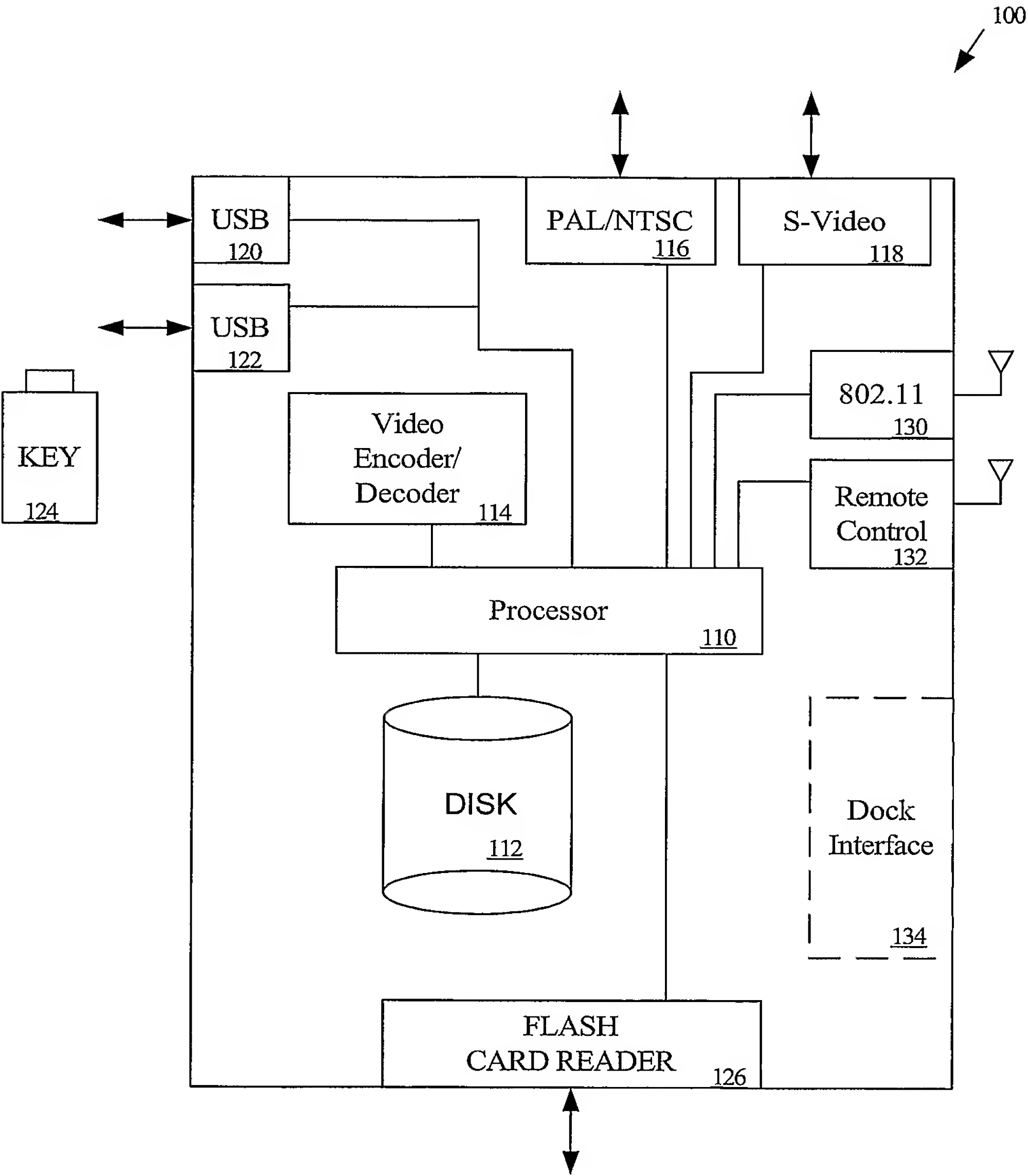


Figure 1

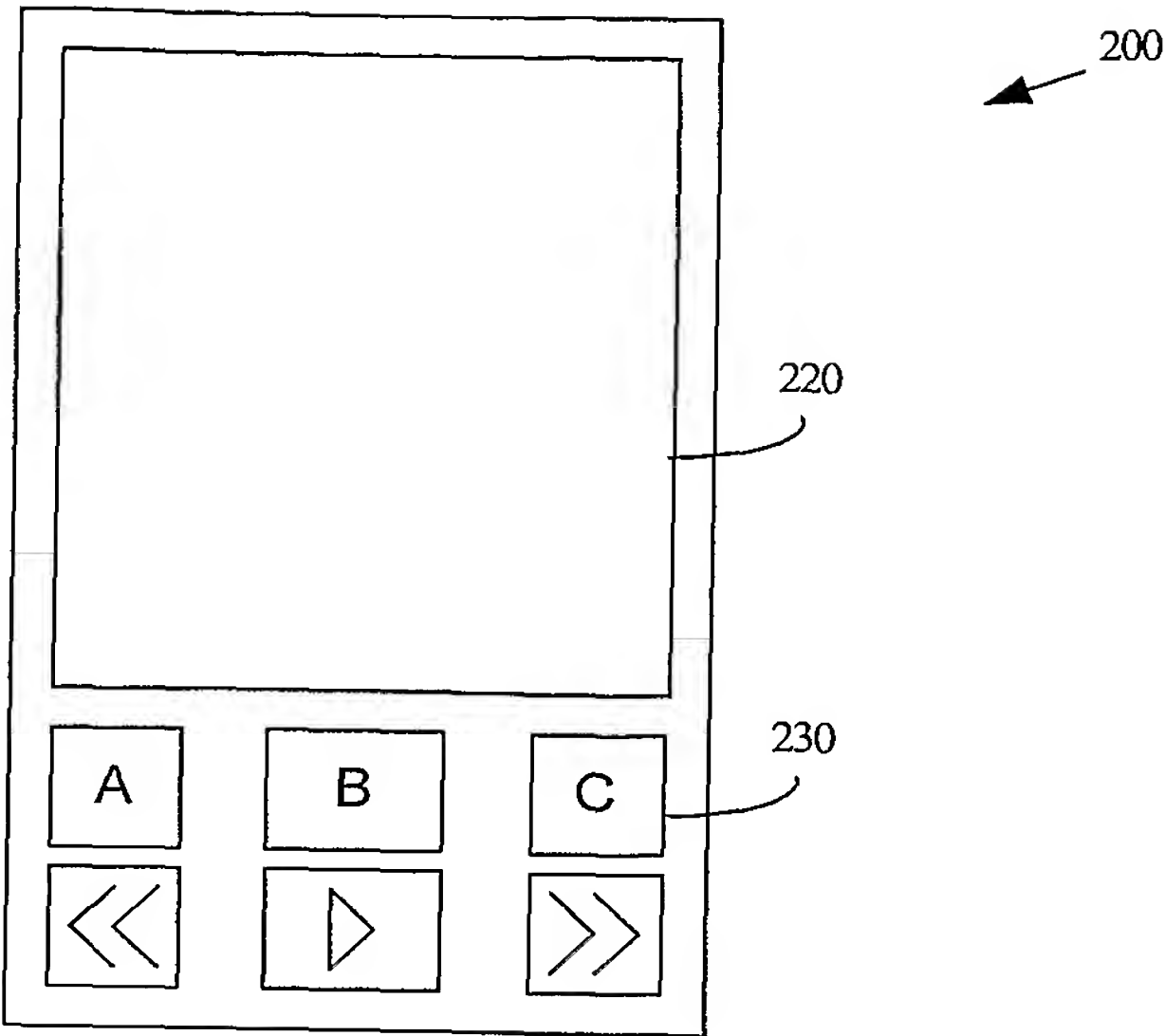


Figure 2A

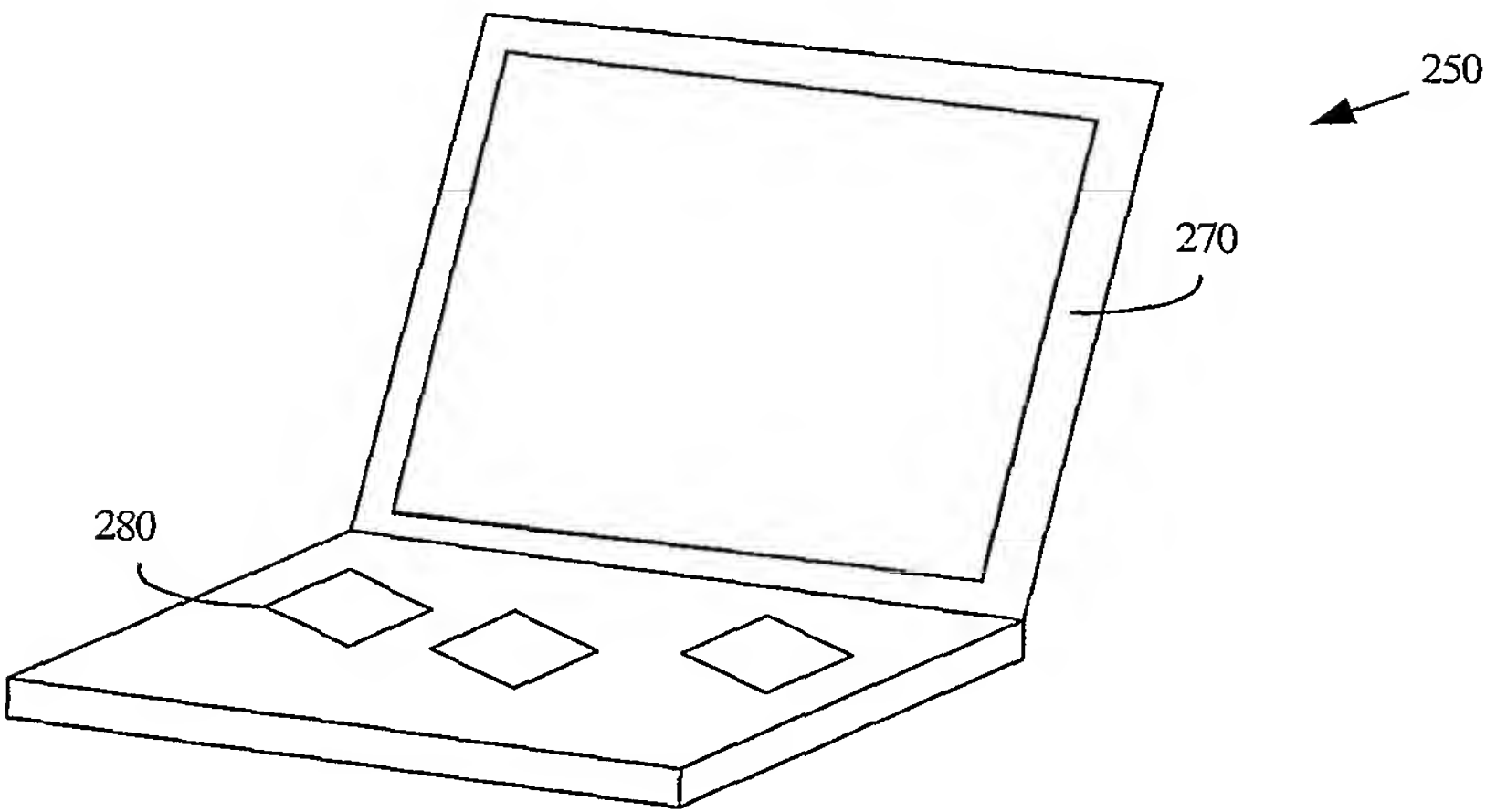


Figure 2B

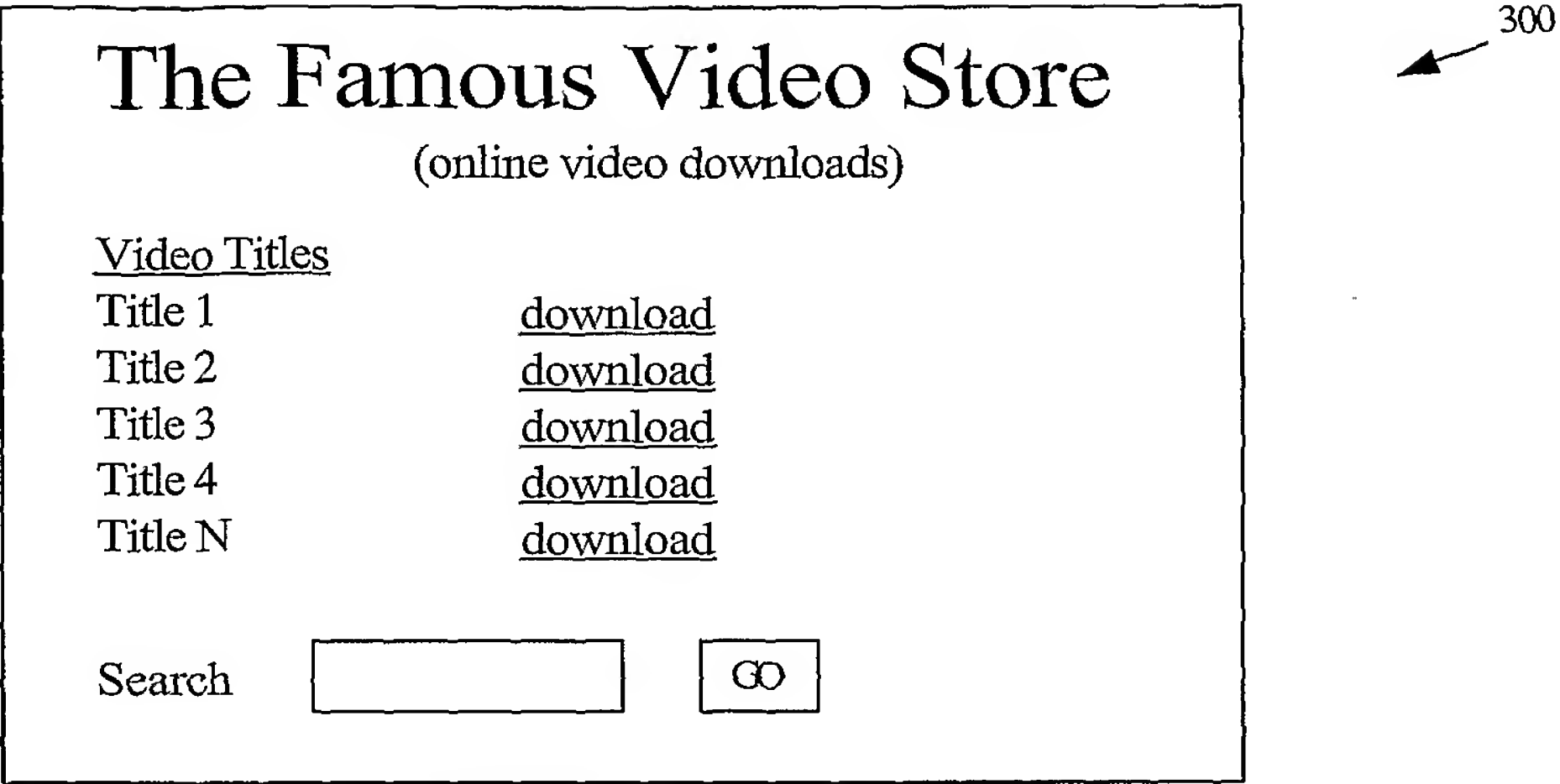


Figure 3A

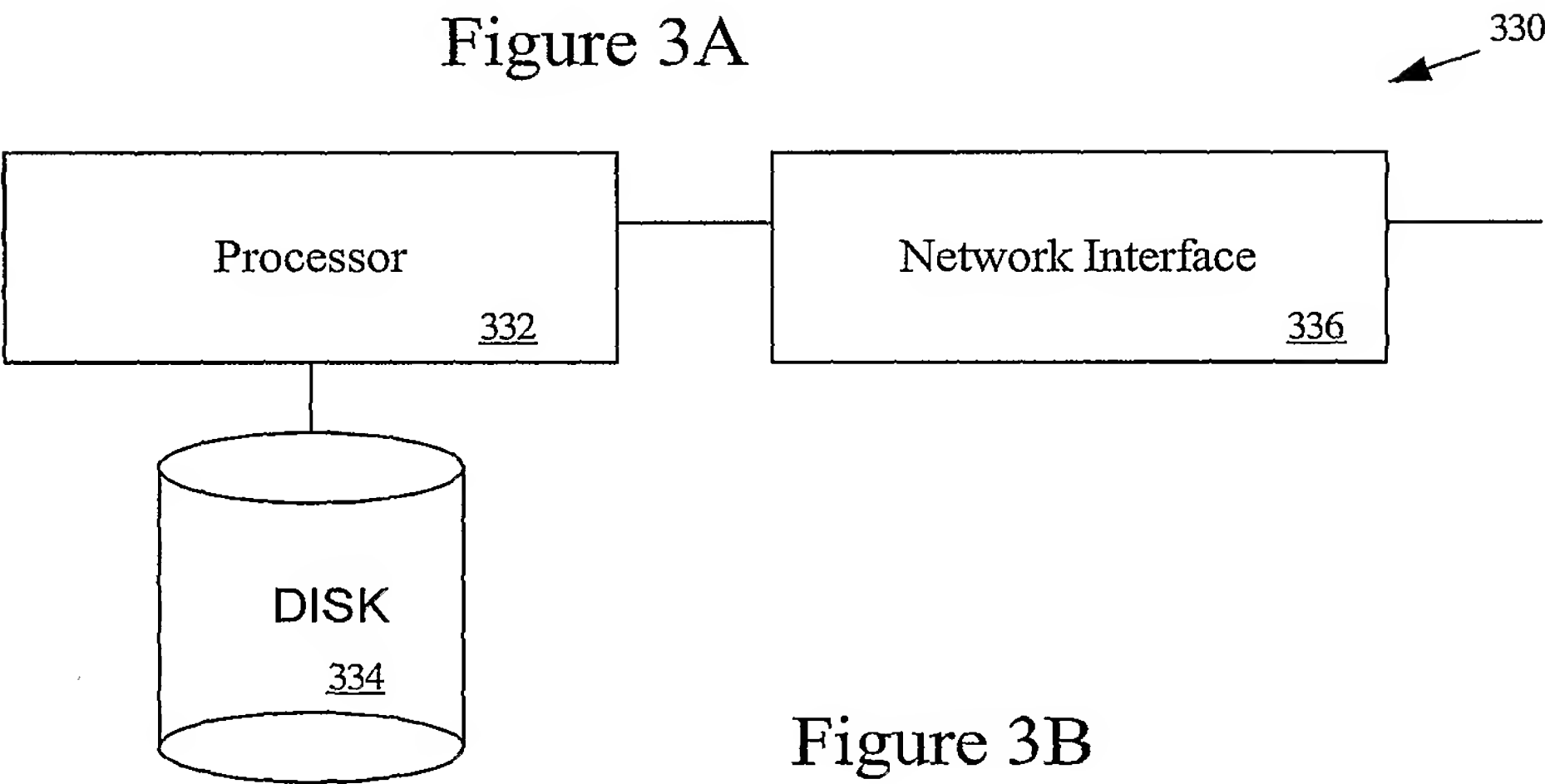


Figure 3B

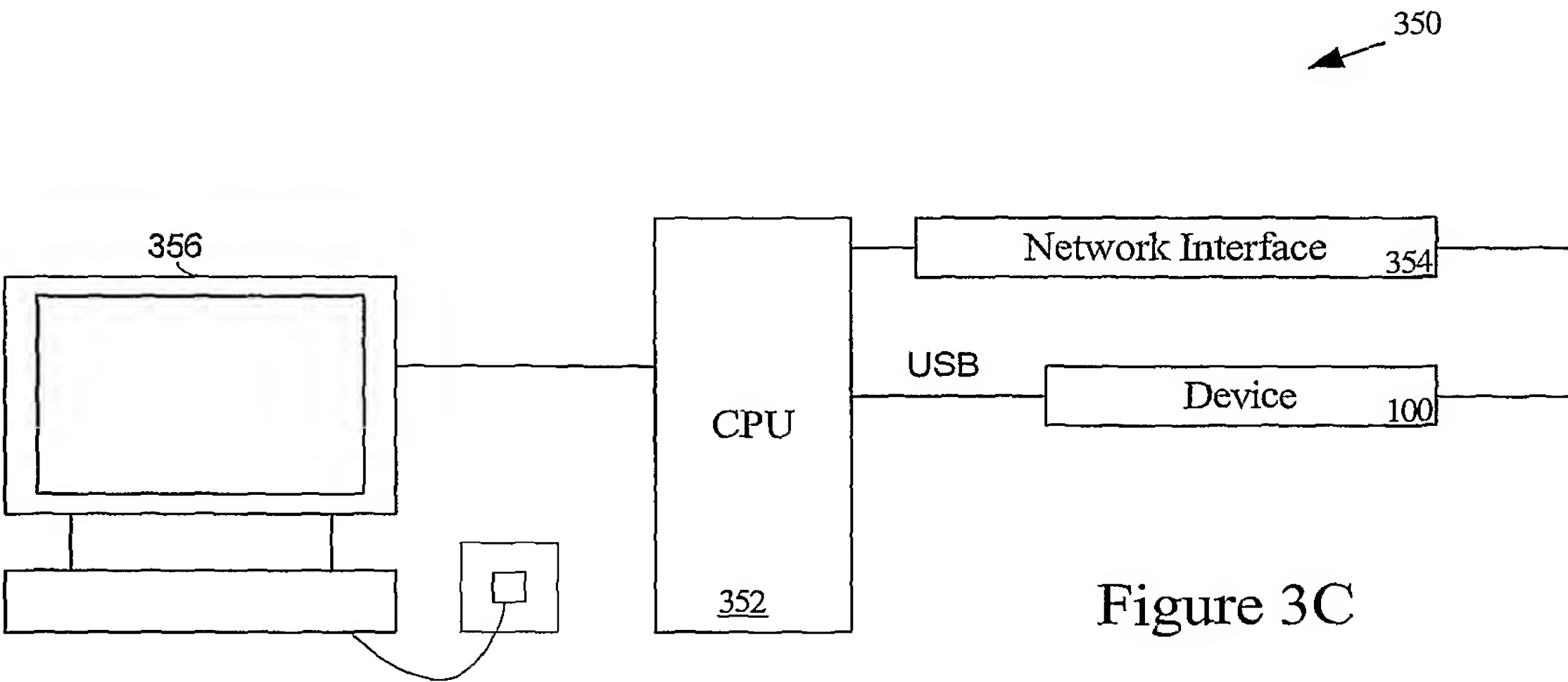


Figure 3C

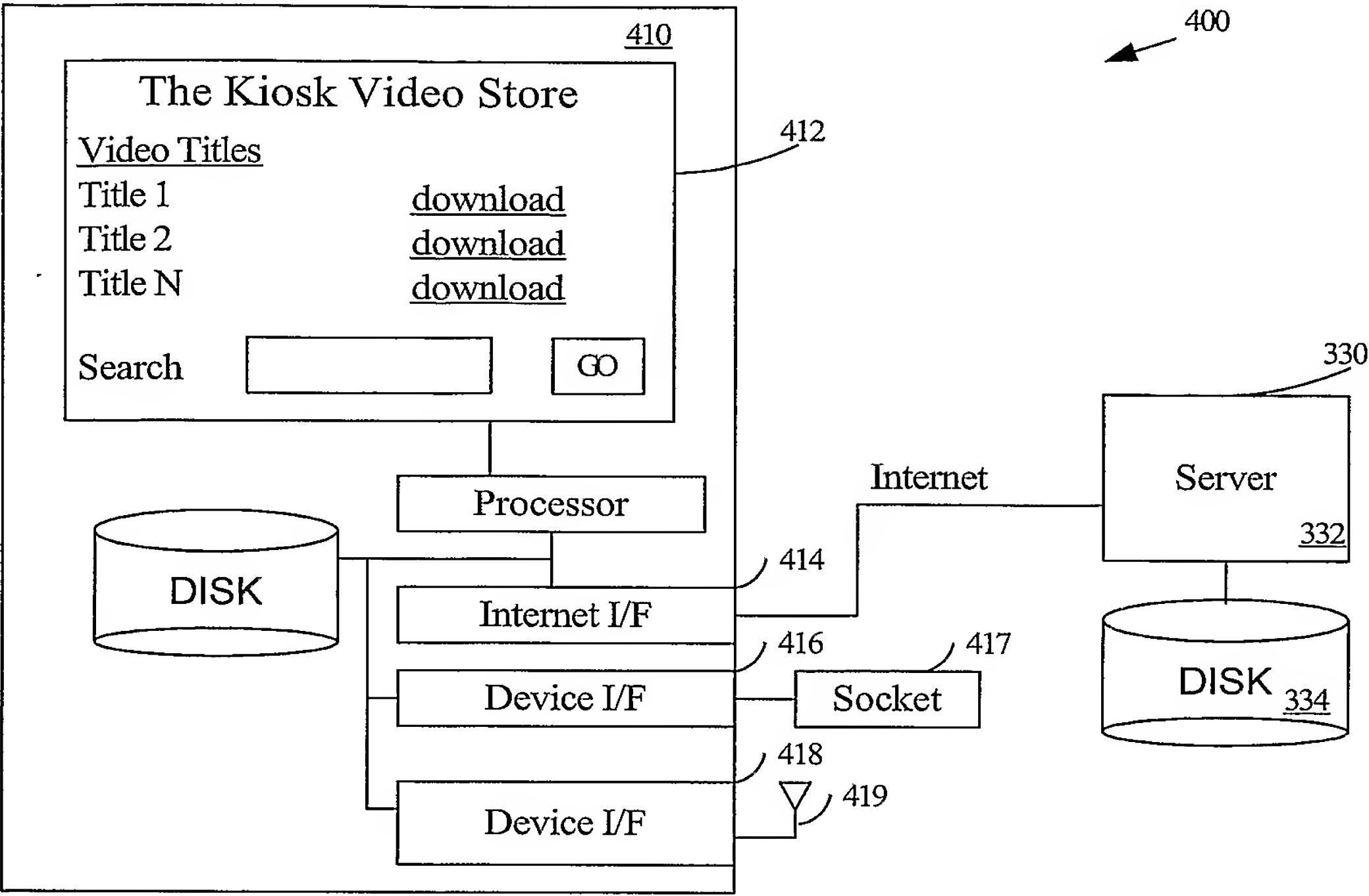


Figure 4

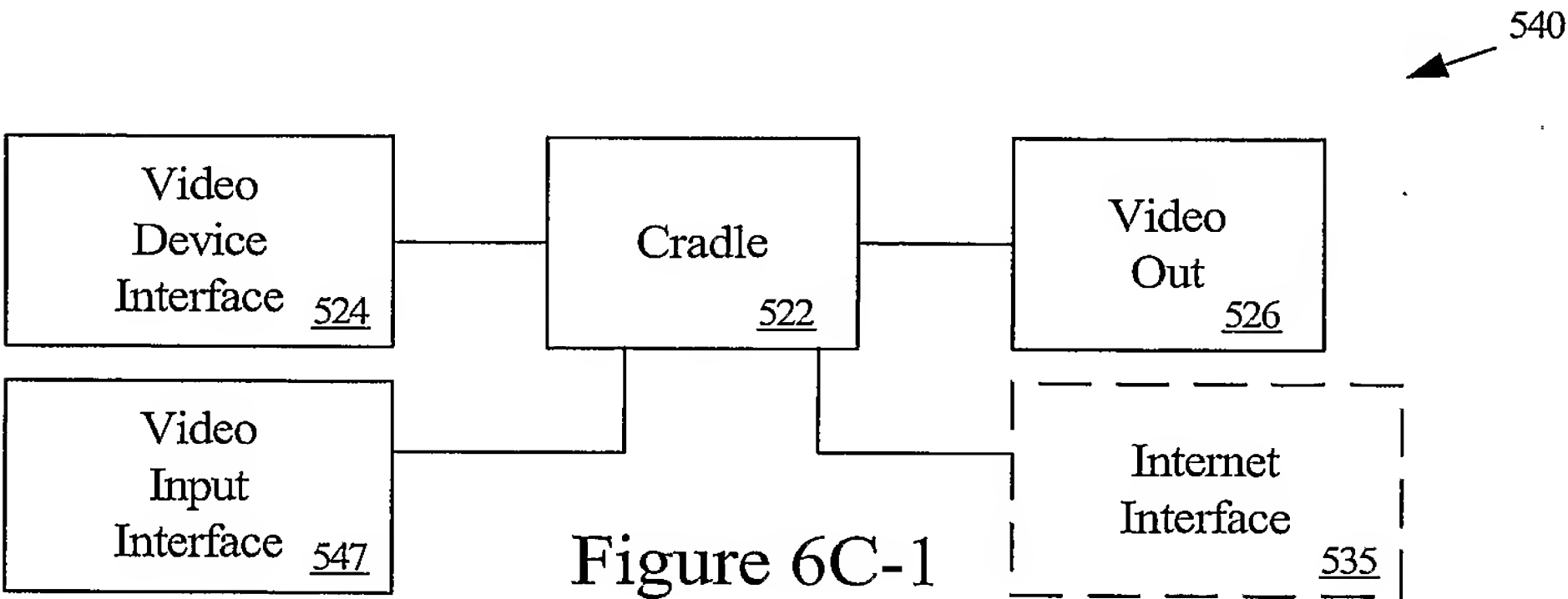


Figure 6C-1

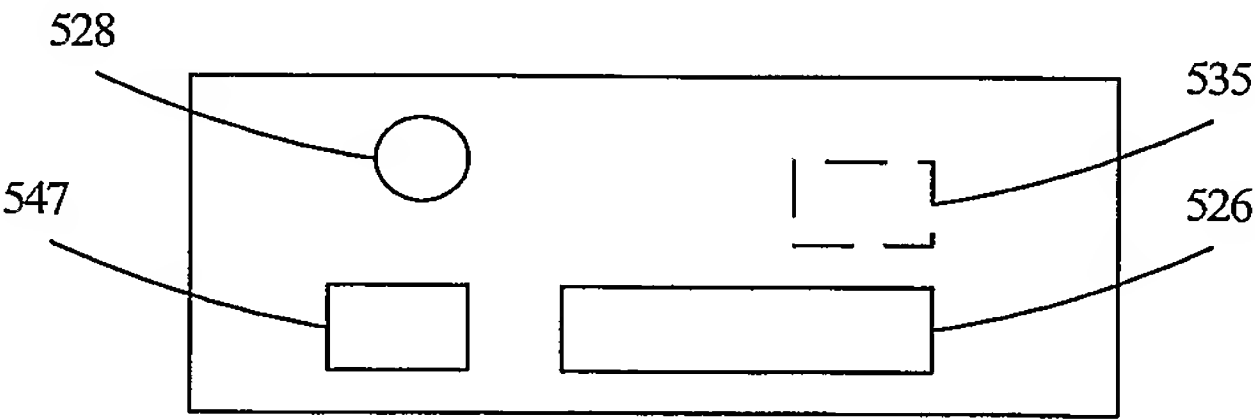


Figure 6C-2

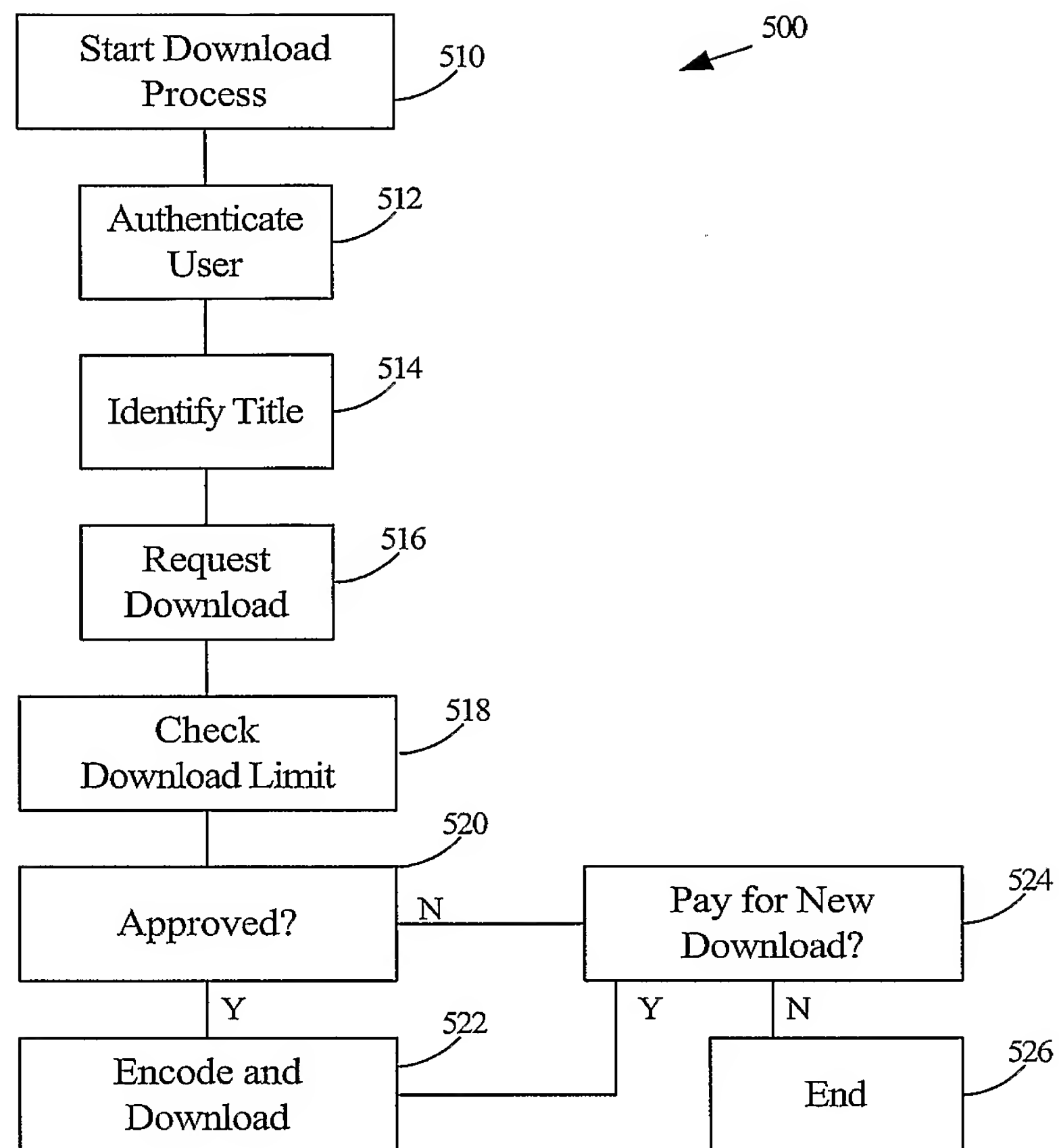


Figure 5A

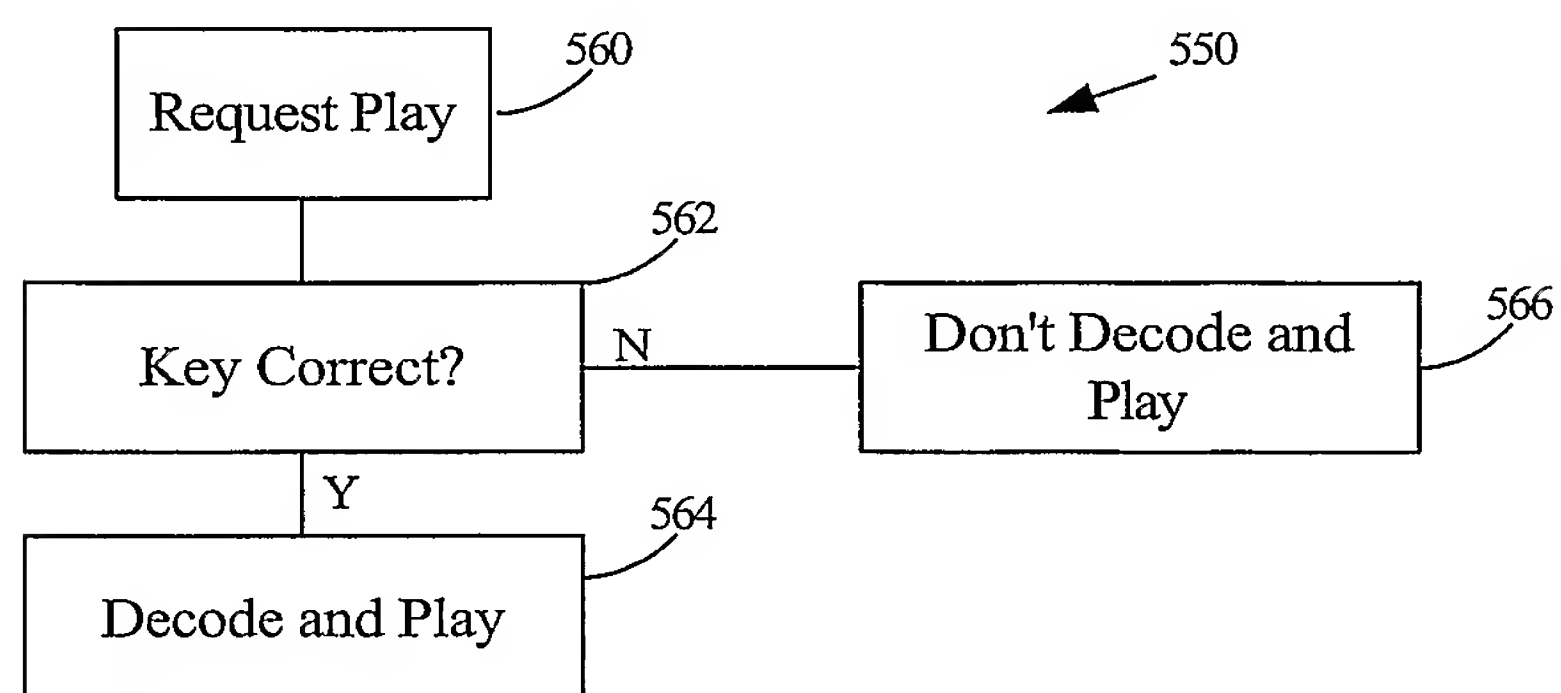


Figure 5B

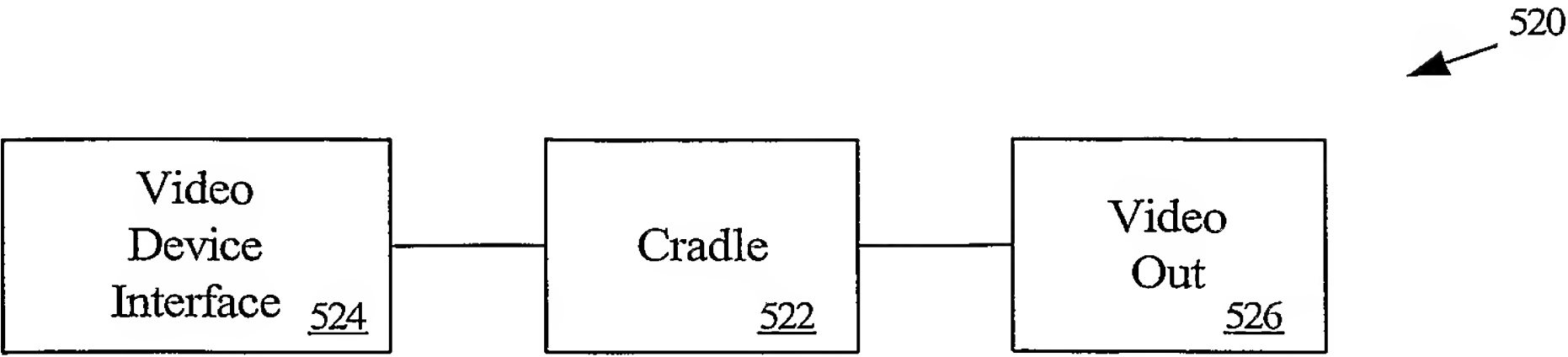


Figure 6A-1

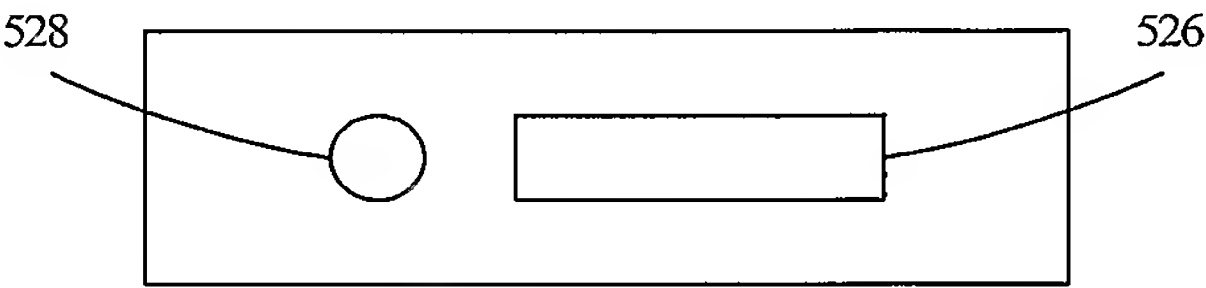


Figure 6A-2

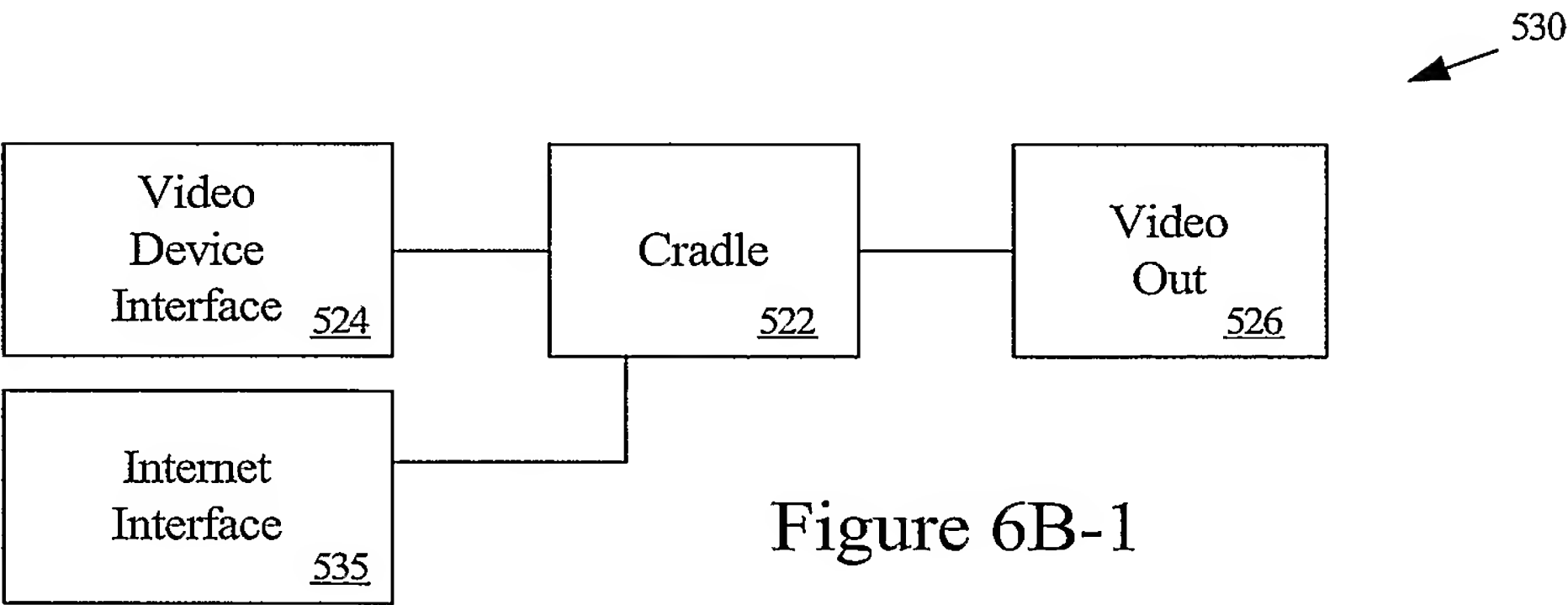


Figure 6B-1

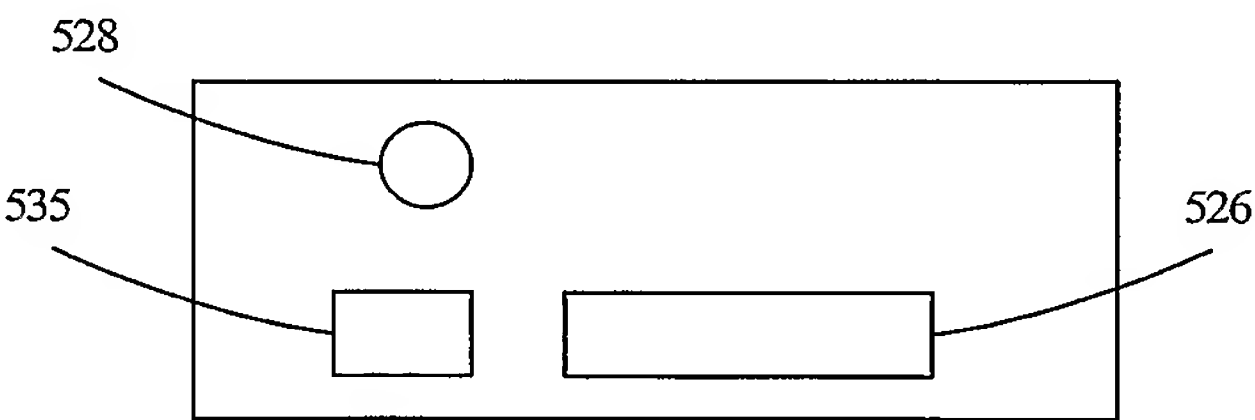


Figure 6B-2